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ABSTRACT

This paper contains a discussion of the limitations of research on group processes in complex organizations and the manner in which a procedure for network analysis in on-going systems can reduce problems. The research literature on group uniformity processes and on theoretical models of these processes from an information processing perspective is reviewed. An important proposition derived from the model is that the greater the communication network integration of a group, the greater the uniformity in the behavior, and the perceptions of the environment, of members of the group. Communication network analysis is performed on data collected in a large, complex organization, and the relationship between network integration of groups and uniformity is examined in the resultant 56 groups. Moderate support for the hypothesis is found, suggesting that further exploratory research of this nature is justified. The implications of the research are discussed with respect to previous uniformity research, the validity of network analysis, organizational "climate" surveys, diffusion of innovations, and organizational development and design. (Author/RB)

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# Communication Network Integration and Group Uniformity In a Complex Organization

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## ABSTRACT

In this paper we discuss the limitations of research concerning group processes in complex organizations and the manner in which a procedure for network analysis in on-going systems can reduce these problems. We review the research literature on group uniformity processes, largely conducted in the laboratory, and develop a theoretical model of these processes from an information processing perspective.

An important proposition derived from the model is that the greater the communication network integration of a group, the greater the uniformity in the behavior, and the perceptions of the environment, of members of the group. Communication network analysis is performed on data collected in a large, complex organization, and the relationship between network integration of groups and uniformity is examined in the resultant 56 groups. Moderate support for the hypothesis is found, suggesting that further exploratory research of this nature is justified. The implications of the research are discussed with respect to previous uniformity research, the validity of network analysis, organizational "climate" surveys, diffusion of innovations, and organizational development and design.

Problem

In the past twenty five years there have been large numbers of studies conducted which explore variables at the group level of analysis. Many have been directly stimulated by researchers interested in group functioning within formally organized, on-going social systems. Other studies, not specifically designed with respect to formally organized activities of groups, have nevertheless been subsequently related to organizational contexts.

The great bulk of group research has been conducted in laboratory settings. (See Glanzer and Glazer, 1961; Collins and Raven, 1969 for extensive reviews of this literature.) Organizational theorists have been quick to point out that research performed in laboratory environments has limited generalizability to formal organizations (Guetzkow, 1965). Some major factors which restrict the utility of this research in constructing valid, empirically rigorous organizational theory are the "artificiality" of laboratory settings, the biased samples of subjects used (typically college students), limited ranges of group sizes, limited time frame for group functioning, and demand characteristics of the experimental situation which may bias subject behaviors in the direction perceived to be desired by the experimenter.

The conduct of rigorous research on group processes in formal organizations has been inhibited by the difficulty of gaining and maintaining control over organizational variables so that "true" experimental designs (Campbell & Stanley, 1963) can be implemented and causal relationships can be subsequently identified with confidence (Seashore, 1964).

The problem of reduced ability to control variables in the formally organized social system does not in itself impede the conduct of all forms of group research in these settings. When faced with these problems, social scientists have traditionally made extensive use of "correlational" research designs to search for evidence of causal relationships. Up to the present time, most research of this nature has looked only for associations between variables, leaving aside the question of time order. However, this research approach appears to be declining in the face of emerging multivariate techniques for statistical control over variables and relationships; multivariate techniques are being refined and are diffusing readily through communication science and other social science disciplines.*

However, in organizational research there have been relatively small numbers of studies using even correlational designs in investigations of group processes. The difficulty appears not to lie in research design problems, but in problems of isolating the units of analysis for group research. The best information typically available to the researcher concerning the definition of groups in an organization comes from the formal organization "chart." However, this has been found to be a poor predictor of actual structural characteristics in organizations: research evidence suggests that the actual organizational structure often departs from the formally designated structure as the environmental uncertainty of the organization increases--both the uncertainty of the external task environment and internal technological environment (Thompson, 1967; Danowski, 1974b). Also, research defining the on-going communication network structure of organizations has indicated wide discrepancies between prescribed information flow and actual information flow among organizational components (Berlo, et al, 1972).

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*Path analytic techniques enable the accumulation of evidence for not only association, but time-order in theoretic relationships (Blalock, 1971; Land, 1970).

In attempting to overcome the problems of group definition in on-going social systems, social scientists have developed and used a variety of sociometric analysis techniques. These techniques may be categorized into three general areas: matrix manipulation, matrix multiplication and multi-dimensional scaling (Farace, et al, 1973). These techniques generally suffer from limitations of size (excessive computer memory required) and a lack of effective formal criteria to unambiguously delimit subgroups in a large set of elements.

Some of these network analysis techniques have been used in research in formally organized social systems (Jacobson and Seashore, 1951; Schwartz, 1968; MacDonald, 1970; Amend, 1971; Jacob, 1972). However, limitations have inhibited the use of levels of analysis higher than the individual and this research has tended to focus on individuals such as liaisons rather than groups. Either the large numbers of hours required for manual reduction of the data or limitations of computer hard and software capabilities have largely restricted this research to small systems of from 100-200 members in size. Using groups as the unit of analysis in systems of this size would typically yield very small sample sizes.

The techniques for communication network analysis developed by Richards (1971) and Richards, Farace and Danowski (1973) avoid these limitations, enabling the analysis of systems of up to 5,000 in size, with the ability to explicitly define groups using consistent, unambiguous, formalized criteria. Advances in conceptual frameworks and efficient computerization of a network analysis algorithm now make this kind of analysis more feasible.

The research reported in this paper uses the "NEGOPY" communication network analysis program to define groups in a large, on-going, formally organized system. These groups are used to test some propositions derived from the largely laboratory research on the uniformity of group attitudes and behavior--"conformity" research.

Before reporting our research results, we will review the major studies in the group uniformity literature and develop a theoretic model of the uniformity process.

A Review of the Group Uniformity Literature

There has been a great deal of research conducted which explores the relationships of group cohesiveness to a wide range of antecedent and consequent variables (see Lott and Lott, 1961, for a comprehensive review). The concept of group cohesiveness was originally explicated by Festinger, Schacter and Back (1950). It was created to explain their observations that within subgroups of a university married housing community, homogeneous attitudes and behaviors were found. Between groups, however, considerable differences in attitudes and behaviors were noted. Most definitions of cohesiveness, used by a wide array of researchers, coalesce around the assumption that cohesiveness is a function of the attraction that individuals have to a group and the interpersonal attraction of the members of the group for each other.

Back (1950) in an experiment using college undergraduates, manipulated cohesiveness in groups and found that as cohesiveness increased: (1) members made more effort to reach an agreement, (2) influence attempts showed less individual differences, (3) actual influence increased, (4) and changes in attitudes became more evenly distributed.

Schachter (1951) studied not only the effect of increasing levels of cohesiveness on uniformity in groups, but added an additional variable--relevance. Observations of experimentally created groups of college students revealed that: (1) holding cohesiveness constant, as relevance of the group task increases, rejection of deviants increases, (2) holding task relevance constant, as cohesiveness increases, rejection of deviants increases, and (3) the greater the degree of

deviance, the greater the amount of communication directed to the deviant, until the deviant is rejected.

Festinger and Thibaut (1951), in an experiment with college student subjects, found support for hypotheses that: (1) most communication in groups is directed toward members holding extreme points of view, and (2) when subgroup formation is seen as possible, change when influence is exerted should be less than where no subgroup formation is possible.

The relationships between group productivity and cohesiveness were examined by Schachter, Ellertson, McBride and Gregory (1951) in an experiment with university students. They concluded that more cohesive groups will be more productive only if productivity is relevant to the group and if competing reference groups do not develop stronger pressures toward other objectives.

Emerson (1954) replicated Schacter's earlier work using high school students and found that the more "unstructured the opinions" of group members, the greater the shifting of the group norm in the direction of the deviant.

Gerard (1954) created three-person experimental groups of college students in a task requiring individual predictions of a perceived outcome. After individual predictions were made, subjects discussed them; then, predictions were made again. Levels of agreement and attraction were manipulated in the groups. A second phase of the experiment was conducted one week later in which each subject returned, restated his position, was challenged by a confederate under conditions of "moderate attraction," and stated his position again. Analysis revealed that: (1) as attraction increases, the initiation of persuasive attempts increases, (2) as attraction increases, the greater the amount of change in predictions, and (3) in the challenge conditions, the greater the disagreement from the original reference group, the greater the opinion change.

Uniformity research drew criticism because it appeared that most research had been biased in the direction of conforming behavior rather than non-conforming behavior. This may have been an important factor in the decline of research activity in the area. Near the end of the mainstream of the conformity research period, Kelly and Shapiro (1954) attempted to meet this criticism and investigated conformity in a situation in which it was perceived to be detrimental to the success of the group. The acceptance of individuals in the group was manipulated and it was predicted that these individuals would exhibit less conforming behavior under the conditions established. No evidence was found for the predicted relationship, but it appears that this was due to a relationship between perceived acceptance and attraction or cohesiveness. Cohesiveness was not controlled for in the design.

Dittes and Kelley (1956), in an extension of this work, attempted to hold attraction constant while varying perceived acceptance. They were partially successful in that only under high and medium acceptance was attraction constant. Results indicate that in these circumstances, the greater the perceived acceptance by an individual (holding attraction constant) the greater the likelihood that he will deviate from group norms when conformity is detrimental to the group.

By the mid-'50's much of the experimental work on group uniformity largely ceased as social psychological research became more highly differentiated and specialized. However, there were some attempts to examine the previous empirical generalizations in "natural" settings along with some further lab work as well.

Alexander (1964) used a sample of high school students to define cliques or small friendship groups operating in the school and the influence of structure of these groups on the uniformity of drinking behaviors of the members. It was found that: (1) groups exhibited uniformity in drinking behavior, with a large

number of groups having all abstrainers and another large number of groups whose members were all drinkers, (2) drinkers in groups in which all members drink show greater uniformity on what is consumed, frequency of consumption, and self-reported effects, than drinkers in groups in which more than half, but not all drink, (3) deviants receive fewer sociometric choices than the average person in the groups, (4) uniform groups are more attractive to potential members than those in which drinking behavior in not uniform.

Carter, Hill and McLemore (1967) examined conformity in 42 training groups of supervisory-level professional nurses. Attitudes were measured before and after the week-long training sessions. Results indicate that the degree of deviance is an important determinant of attitude shifts toward the group mean over time. The authors propose a social judgement model with regions of assimilation and contrast on a perceived deviance dimension by group members. Individuals within the range of assimilation will not perceive social pressures toward uniformity, while those beyond this range will and will shift toward the group mean. It is further pointed out that the perceptions of the social context and degree of structuredness of group norms are important environmental variables to be considered.

Rule and Renner (1965), in a laboratory experiment with college students, found that change in the direction advocated by a group increased as discrepancy between member opinions and the group norm increased. Also, change increased as the homogeneity of group opinions increased.

We have now reviewed the major findings in the group uniformity literature. Out of the empirical findings which have been made, we will formulate a theoretic model of the group uniformity process which will integrate and account for them.

First, definitions of concepts will be presented, followed by a set of axioms, then some derived theorems, and finally, some major highlights and

implications of the model will be discussed. Following the development of the model, we move to a discussion of the specific original research findings relating communication network structural integration to group uniformity.

We would like to point out that a major perspective taken in the development of the model is information processing. Hence, major variables of concern will be uncertainty (Knight, 1921; Shannon and Weaver, 1949; Garner, 1962) and preference for uncertainty (Eckblad, 1963; Munsinger and Kessen, 1954; Dorfman and McKenna, 1966; Schroder, Streufert and Driver, 1967; Rump, 1968; McNeil and Rule, 1969; Swartz and Herbik, 1971).

Definitions

* preference for uncertainty is a function of the desire for the amount of variation in environmental components.

* perceived need for task efficiency is a function of the perception that rewards can be accrued or punishments avoided by the performance of a task with a high ratio of energy expenditures to the achievement of objectives.

* perceived relevance of behavior to uncertainty reduction is a function of the perceived ratio of the uncertainty reducing potential of the behavior to the estimated amount of energy required to perform the behavior.

* relative cohesiveness is a function of the interpersonal attraction of members of a group for each other, which will be a function of the perceived potential rewards to be obtained from participation in the group relative to the estimated amount of energy required to participate in the group. The degree of influence the value of this ratio has on the relative cohesiveness in the group is a function of its size relative to the size of ratios of other groups which the group members define as within their perspective social networks.

* message effectiveness is a function of the relative amount of change in a resultant behavior rate which is effected by the receipt of a message by an individual.

* group conceptual space is composed of conceptions relevant to the group, with the distances among these conceptions represented in an "n"-dimensional coordinate system.

* individual conceptual space is composed of conceptions with distances among them represented in an "n"-dimensional coordinate system.

* behavioral uncertainty is a function of: the ability to assign probabilities to alternative behavior rates on the particular behavioral dimension, the ability to assign probabilities to alternative outcomes of these behavioral rates (feedback from the environment) and the ability to assign desirability values to these outcomes.

* status is a function of the attribution of responsibility, power, competence and attractiveness to an individual by the members of a social network or group.

* status uncertainty is a function of the perceived stability of status in a social network over time.

* behavioral/conceptual uniformity is a function of the variance in rates of behavior or the variance in the relative inter-conception spatial distances across members of a social network.

## Theoretic Model of Group Uniformity Processes

### Axioms

1. Lower preference for uncertainty among the members of a group produces greater cohesiveness in the group.

2. Greater perceived need for task efficiency produces greater cohesiveness in the group.

3. Greater perceived relevance of a behavior to uncertainty reduction in the group, the greater the cohesiveness in the group on that behavioral dimension.

4. Greater cohesiveness in a group is mutually causally related to greater numbers of messages exchanged among all members of the group.

5. Greater relative cohesiveness in a group produces greater effectiveness of messages exchanged in the group.

6. Greater cohesiveness in the group produces an increase in the relative number of messages sent to individuals whose own conceptual space has greater dissimilarity with respect to the group conceptual space.

7. When the cost of sending messages to move a distant individual's conceptual space toward greater overlap with the group conceptual space becomes equal to the value of the individual to the group, the distant member will be rejected and message sending will cease.

8. Greater uncertainty on a behavioral dimension in a group produces a greater shift of the group conceptual space toward the conceptual space of an individual creating divergent information in the group.

9. The greater the overlap between an individual's conceptual space and the group conceptual space, the higher the status of the individual.

10. Given an individual of high status, the lower the status uncertainty of the person, the greater the amount of uncertainty the person can introduce in the conceptual space of the group.

11. The higher the status and the lower the status uncertainty of an individual, the greater the shift of the group conceptual space toward the conceptual space of the individual creating divergent information.

Some Derived Theorems

1. The lower the preference for uncertainty in a group, the greater the number of messages exchanged among members of the group.

2. The lower the preference for uncertainty in a group, the greater the relative number of messages sent to members whose conceptual space has greater dissimilarity with respect to the group conceptual space.

3. The greater the perceived need for task efficiency in the group, the greater the number of messages exchanged among members of the group.

4. The greater the perceived need for task efficiency in the group, the greater the relative number of messages sent to members whose conceptual space has greater dissimilarity with respect to the group conceptual space.

5. The greater the perceived relevance of a behavior to uncertainty reduction in the group, the greater the number of messages exchanged among members of the group.

6. The greater the perceived relevance of a behavior to uncertainty reduction in the group, the greater the relative number of messages sent to members whose conceptual space has greater dissimilarity with respect to the group conceptual space.

7. The greater the relative cohesiveness of the group, the greater the behavioral/conceptual uniformity in the group.

8. The greater the relative cohesiveness of the group, the less the rejection of members from the group.

9. The higher the status of a member of the group and the lower the status uncertainty, the less likely is rejection from the group.

In this next section we would like to discuss some of the highlights of this model and its implications.

At a general level, the use of concepts like uncertainty and preference for uncertainty in the model make it possible for the integration of this research area into a generalized information processing approach to human communication and behavior. We propose that as scientists of communication phenomena we ought to strive to develop theory about communication behavior which is wide in scope and parsimonious. The use of an information processing perspective is suited to the accomplishment of this objective. Many systems conceptions of social processes have noted that the processing of information is a key definer and determinant of system functioning. The potential to use measures of information derived from information theory (Shannon and Weaver, 1949) offers promise for the use of concepts and operationalizations which are sufficiently content-free to enable their use in a wide variety of contexts with precision, hence contributing to theoretic parsimony and predictive and explanatory power.

With respect to particular aspects of the model, the notion of 'preference for uncertainty' merits discussion. Research from an information processing perspective cited earlier has shown that individuals vary in the extent to which they prefer variation in stimuli perceived in their environments. The first axiom proposes that the degree of preference for uncertainty will determine the cohesiveness in the group. This notion is similar to the need for "social reality" posited by Schachter (1951) and Gerard (1954) deriving from "reference group theory" (Merton and Kitt, 1950). Essentially, this notion is that people have a need to have their perceptions of the environment validated by observing that others indeed view the world in the same basic way. Individuals are thought to distribute on this dimension. We assume that preference for uncertainty is learned through the socialization process.

The axiom concerning perceived need for task efficiency has particular relevance to communication and behavioral processes in formal organizations. In these systems, the rewards and punishments for task performance are likely to be controlled by the power structure to a much larger degree than in informal social systems. The amount of means control which a formal organization has over its members will have a large impact on the values for this variable.

We have utilized the construct of cohesiveness in the sense developed by Back (1950)--the attraction of a group for its members. However, we have further defined attraction in terms of Social Exchange theory (Homans, 1961; Blau, 1964; and, Thibaut and Kelly, 1959). It should also be noted that the concept of relative cohesiveness is used. It is assumed that for any behavior, an individual will have attractions to more than one group. Some of the groups will elicit greater attraction than others. It would be possible to construct for an individual a range of groups on a particular behavioral dimension, with minimal attraction at one end and maximum attraction at the other. An individual's net attraction to any specific group can then be gauged by constructing a ratio of the particular attraction level to the total attractions to all other "reference groups" on a particular behavioral dimension. This principle can then be used to account for individual differences in uniformity of behavior in small group contexts.

In previous work on relationships between cohesiveness and uniformity there is little attention to the development of explanatory principles for the why of the relationships. The propositions are largely empirical generalizations unlinked by integrating explanatory principles.

In this model an explanatory principle for the central relationships can be derived from the "linear force aggregation theory" explicated by Woelfel (1971).

The theory offers a law-like explanation for the cohesiveness/uniformity relationship.

In brief, the theory can be considered an application to human behavior of Newtonian Mechanics. Key concepts are force of messages, inertial mass of behaviors and resultant behavioral rates.

If behavior can be considered as rates (e.g., number of task units completed per day) or pseudo-rates (degree of favorability toward task completion) then the behavior or attitude of an individual will be equal to the average of all proposed behavior rates which an individual receives in messages from all sources, with each message weighted for its effectiveness. The effectiveness of a single additional message is measured by the ratio of the inertial mass of the message to the total inertial mass of the accumulated information. The more effective the message, the greater its influence in determining the resultant behavior of an individual who receives the message.

Woelfel does not consider why messages have differing degrees of effectiveness. However, this is an important theoretic question which has relevance here and in other theoretic formations. We propose that message effectiveness is a function of the attraction of the receiver of a message for the source of a message (in terms of expected pay-offs). The greater the attraction, the greater the effectiveness of the message sent from source to receiver.

We have stated in the model that the greater the cohesiveness, the greater the number of messages sent to an extreme individual. In terms of linear force aggregation theory, this will move the person's behavior/perceptions to the mean of the accumulated information.

If the individual is behaving outside the group "norm," and messages are then sent to him by group members (holding messages from outside the group

constant), his behavior will change as a function of any or all of the following: increases in attraction for sources of the messages, increases in numbers of messages, or changes in the proposed behavior rates in messages from sources. Over time, the behavior/conceptions of the individual will approach the group "norm" at a rate determined by his attraction to the in-group source relative to the out-group sources (relative cohesiveness) and the magnitude of the proposed behavior rates.

In the model, we have chosen to discuss what has traditionally been defined as group "norms" in terms of a "group conceptual space." We will briefly explicate the notion of a "conceptual space." Woelfel (1973) discusses an approach to measuring the collective conceptions of social systems in terms of the dissimilarities which members of the social system perceive among sets of objects or concepts. The measurement of these dissimilarities can be conducted using a continuous ratio scaling technique which asks respondents: "If x and y are u units apart, how far apart are a and b?"

Dissimilarities among objects can then be quantified such that two objects considered completely identical are assigned a paired dissimilarity score of zero (0) and objects of increasing dissimilarity are represented by numbers of increasing value. The average distances which members of a social system perceive among a set of conceptions is then represented in matrix form, and operations are performed on the matrix to yield a spatial coordinate system of "n" dimensions. Each conception can then be identified by its position with respect to each dimension (see Torgerson, 1952, 1958, for a discussion of metric multidimensional scaling; Kruskal, 1964, for a discussion of non-metric multidimensional scaling; Barnett, 1972, for a discussion of validity and reliability; and Serota, 1974, for a review and program description).

This kind of approach yields a representation of a group conceptual space. In terms of group norms, this space will represent the collective definition of the distances between conceptions which may be interpreted as the normative structure of the social system. Dealing at a higher level of analysis, but along similar lines, Woelfel (1973) has used this approach to define the "culture" of a large social system.

Communication Network Structures and Uniformity

An important question in research on organized social systems is "what are the effects of the patterns of information flow on the behaviors an perceptions of system components?" A large tradition of organizational writing suggests that the structure of the organization is an important determinant of organizational processes, or is defined by patterns of organizational processes (Weber, 1947; Etzioni, 1961; Blau and Scott, 1962). This is an important assumption for those in the area of organizational development and change who attempt to manipulate structure to achieve defined objectives for social change within organizations (Likert, 1967; Thompson, 1966; Litterer, 1963).

We define the structure of social systems as the patterns of information flow among components of the system. Hence, the structure of a system is representable as a communication network. The communication network is comprised of a set of nodes which are linked together through relationships of varying strengths. Such variables as the number of messages or the importance of messages of various content types can be used to measure the strength of these relationships.

Previous use of communication network analysis techniques developed by Richards (1971), and Richards, Farace and Danowski (1973) has shown them to be useful means of describing the structural configuration of a social system (Berlo, et al, 1972). This is an important preliminary step toward the development of theoretic

propositions regarding communication network and related variables. However, for the development of theory we must move beyond description to examing the relationships among communication network variables and also among network variables and other variables. The research reported here makes a preliminary attempt to do this.

In this particular research we seek to answer the question: "Does the degree of structural integration of groups in a communication network predict the degree of homogeneity of behaviors within groups?"

In the literature we reviewed in the previous section of this paper, we gathered evidence to suggest that the greater the attraction of members of a group for each other, the greater the cohesiveness of the group. The research shows that the greater the cohesiveness of a group, the greater the number of messages exchanged by group members, Bovard (1951a, 1956a, 1956b), Sherif and Sherif (1953), and Deutsch and Collins (1958). Also, at a dyadic level it has been demonstrated that the greater the liking or attraction between members, the higher their frequency of communication, Byrne (1961a), Wilson and Miller (1961). Given these empirically supported propositions, it will be the case that more cohesive groups will have more highly connected internal communication network structures. Therefore, more highly connected groups will exhibit greater uniformity of behavior.

## Research Procedures*

To test the proposition we have proposed, a communication network analysis was performed on a large organizational unit in an eastern financial institution

*The research reported here is a secondary analysis of data collected for other purposes. Hence, we are limited to a simple regression analysis and are not able to perform more advanced multivariate analysis of the data such as path analysis.

which processes stock and bond transactions. Nine hundred and sixty three (963) respondents were asked to report which of the others in this set they communicated with and at what frequency levels. These data were input to a computerized communication network analysis which identified 56 groups in the system.

A group is defined as a subset of elements (of at least three in size) in a larger set who exchange more than 50% of their messages with others in the subset and who are connected directly or indirectly through some path of links lying entirely within the group.

For each of the 56 groups, values were calculated which measure the structural interconnection of the communication network within the group. The particular measure used is "connectedness" which is a ratio of the number of links in the group to the total number of possible links in the group (Berlo, et al, 1972).

$$C = \frac{\text{\# actual links}}{n\,(n-1)/2}$$

where n is the number of persons in the group.

This yields a measure of the relative structural integration of the communication network group which controls for the size of the group.

The dependent variable in the research was constructed out of a set of items which were asked of the respondents and which appear on face to be relevant to the groups. The following items were used:

Desire for information

How important is it to you to know what's going on in your section?
a) I'm not interested in knowing things unless they affect me personally
b) I like to keep up on some of the things that go on
c) I like to know about most things--it's good to be "in on everything"

Desire for involvement

How involved do you want to be in making decisions that affect you and your work?
a) I want to be involved in any decision that affects me
b) I'd like a little involvement, but only in really important things
c) I don't want to get involved in these decisions--that's my supervisor's job

Interpersonal conflict

How well do people in your section get along together?
a) we get along better than most
b) we get along about as much as others do
c) we really don't have much to do with each other

Helping behavior

How well do people in your section help each other in their work?
a) we help each other out more than they do
b) we help each other out about as much as they do
c) we really don't have anything much to do with each other

Information levels

When there are changes that affect you, how well informed is your section?
a) we usually know more than they do
b) we usually know about as much as they do
c) we usually know less than they do

Adapting to change*

How much of a problem do you think your move will cause on the work you do?
a) it won't cause any problems at all
b) there will be problems, but they won't last long
c) there will be serious problems

The responses for all the members of each of the 56 groups yielded a distribution of behaviors for each group. The degree of uniformity of behavior in each group is measured by the standard deviation of the group distribution. The smaller the standard deviation, the greater the homogeneity or uniformity of behaviors and perceptions of the environment in the group. Descriptive statistics for all variables appear in Table 1.

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INSERT TABLE 1 HERE

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Zero-order Pearson 'r' correlations were computed between the connectedness of the groups and the standard deviations on each of the items. The results in Table 2 indicate moderate support for the hypothesized relationship. Four of the six correlations are beyond the .10 level--a standard criterion level for exploratory research.

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*The division in which the data were gathered was going to move operations to a new physical location in the near future.

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INSERT TABLE 2 HERE

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The size of the correlations are only moderate. However, the size of these correlations is likely to be suppressed by the level of abstraction at which the network was defined. Data used for the analysis include communication across production, maintenance, and innovation content categories (Berlo, 1970). As such it is likely that the relevance of the behavioral dimensions of these particular groups is lower than will be the case if the communication network content dimension and the behavioral dimensions overlap more completely. For example, a communication network analysis defined solely on production or work-related communication should yield groups whose structural integration will have a greater relationship to the uniformity of perceptions of and responses to the concept of "production" or actual behavioral measures of productivity.

## Discussion

There are a number of important implications of the proposition we have supported with this research. First, it provides evidence that some of the propositions formed and tested in the experimental laboratory settings with college student subjects are generalizable to on-going formal organizations.

Second, it illustrates the feasibility of using communication network analysis techniques to conduct research on group processes in organizations. Also, evidence is provided which suggests that communication network analysis techniques are valid for quantifying the structural properties of social systems, and that measures derived from network configurations have predictive validity in relationships with non-network behavioral variables. The moderate support for the relationship suggests that further exploratory research to test the propositions of the theoretic model is justified.

Third, it suggests that the global aggregation of responses typically performed in "climate" surveys of organizations loses a great deal of important information about the processes of on-going or "organizing" systems. Our findings indicate that regions of an organization with different communication network structures will have members which behave in predictably different ways as these structures vary.

Therefore, climate surveys alone will provide poor quality information about the state of a system at a point in time. This is provided of course that we define information as the reduction of uncertainty about the environment, and that we assume more information is good (below a point of overload).

It appears reasonable to assume that "climate" studies ought to be coupled with communication network analysis in the research context to yield both important theoretic and applied knowledge.

In addition, the selection of particular communication content dimensions for network analysis provides a guide to the selection of more efficient, valid, and reliable climate instruments, in reducing the number of alternative items which need to be decided upon. Hence, both the researcher and the user of research are faced with less uncertainty in coping with their environment. The researcher has less uncertainty in questionnaire design, measurement problems, and theoretic interpretation; the user has less uncertainty about the state of his/her system and which alternative strategies for organizational change are practical and effective.

Fourth, this research has important implications for the development of theory and the practice of the diffusion of innovations and the closely related area of organizational development. It appears that the degree of structural integration of groups in a social system will determine the rapidity with which

change will take place as a function of divergent information or "innovations" (Rogers, 1971). Those groups with lower degrees of structural integration are likely to change behaviors more quickly in the direction of the proposed behaviors they receive in messages from "significant other" system components. This may occur as a result of needs to reduce the higher amount of environmental uncertainty which this research shows is found in the perceptual domain of units with lower degrees of structural integration.

Fifth, it has important implications for organizational design. This information provides preliminary guidelines for the design and implementation of organizational communication network structures which can increase the likelihood that the system will adapt to changing environmental conditions in accordance with desired objectives.

## Conclusion

In this paper we have discussed and reviewed the basic laboratory research on behavioral uniformity in social groups. We have presented a systematic theoretic model of the relationships among major variables and suggested an overarching explanatory principle derived from Woelfel's Linear Force Aggregation Theory. Communication network analysis is used to define a set of groups in a large financial organization and the relationship between the structural integration of these groups and uniformity of group behavior is tested with these data. Support is found for the proposition that as group communication network integration increases, behavioral uniformity in the group increases. The implications of this finding for group uniformity theory, the validity of communication network analysis techniques, organizational climate analysis, diffusion of innovations, and organizational development and design are discussed.

TABLE 1. Descriptive Statistics

| Variable | Mean | S.D. |
|---|---|---|
| Group size | 8.02 | 3.61 |
| Connectedness | 0.42 | 0.17 |
| Desire for information | 0.50 | 0.23 |
| Desire for involvement | 0.43 | 0.32 |
| Interpersonal conflict | 0.56 | 0.33 |
| Helping behaviors | 0.60 | 0.31 |
| Information level | 0.50 | 0.23 |
| Adapting to change | 0.56 | 0.16 |

n = 56

TABLE 2. Zero-Order Correlations: Connectedness and Behavioral Uniformity

| Dependent Variable | 'r' | Sig. |
|---|---|---|
| Desire for information | -.11 | .20 |
| Desire for involvement | -.33 | .01 |
| Interpersonal conflict | -.17 | .10 |
| Helping behaviors | -.30 | .01 |
| Information level | -.15 | .13 |
| Adapting to change | -.18 | .09 |

n = 56

* Although the data are a census of one division of an organization, hence violating the assumptions of inferential statistics, we report alpha levels to provide a guide for judging the stability of these correlations.

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